BIOTIC AND PHYSICAL RESPONSES TO REHABILITATION ALONG THE BRONX RIVER IN THE BRONX: EVALUATING SUCCESS & MONITORING APPROACHES

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Rehabilitation efforts along the Bronx River for the past 10 years have been aimed at controlling invasive species, increasing the extent and diversity of native vegetation, increasing aquatic habitat diversity, and reducing erosion and other sources of non-point source pollution. Relatively few of the rehabilitation actions have been systematically evaluated, but beginning in 2002, we began three summers of benthic invertebrate and vegetation monitoring to try to assess the measurable effects of the rehabilitation actions. Benthic invertebrate sampling was conducted at eight sites along the river. Vegetation monitoring plots were established primarily in the northern freshwater section of the Bronx River in areas where invasive plant removal and re-vegetation efforts were focused. Basic hydrological and channel morphologic impacts of the rehabilitation measures were also assessed.

The benthic invertebrate data was used to determine the values of water quality indices at each site. The most common taxonomic groups in the river as a whole were moderately to very tolerant of pollution, and the majority were collector gatherers. A lack of data prevented comparison of change over time at several freshwater sites where most rehabilitation activity had occurred. In general, the northernmost freshwater section of river in the Bronx had the most diverse benthic community, while downstream sites showed greater water quality impacts or a downward trend over time. Rehabilitation efforts to date have not had a significant impact upon the flood hydrograph, and channel cross-sections have shown trends towards pre-project conditions, as well as the stability of constructed pools.

The vegetation data was categorized and assessed in relation to reference invasive-dominated and native dominated riparian vegetation communities. The results suggested that differences in treatment, management, and position in the landscape resulted in a continuum of responses ranging from complete reversion of a site to invasive species, to a trend towards fewer invasive and more dominant native species. The only significant trend across the data appeared to be a greater trend towards reference conditions following restoration in the southern end of the floodplain forest, potentially as a result of the greater riparian buffer, more canopy, and more use of rooted plantings.

Our vegetation monitoring results suggested that invasive species management is not sufficient to ensure greater native species recruitment and also pointed to potential challenges in using bioengineering. However, the monitoring was not designed to discern between different environmental or management factors in the trends we observed. Benthic monitoring, although not a direct measure of the performance of the riparian rehabilitation measures, served as useful diagnostic tool and provided an indication of the restoration potential of a stream system over a longer timeframe. Channel morphologic and hydrologic parameters monitored were also not necessarily sensitive to the scale of the projects or the short time frames. Monitoring efforts along the Bronx River underscore the need to target monitoring towards the specific parameters that one intends to impact through rehabilitation efforts, including educational and recreational characteristics and functions of a site.

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